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CONTENTS

DESCRIPTION

LEGEND (SOIL & ROCK)

CROSS SECTIONS

TITLE SHEET

SITE PLAN

BORE LOGS SOIL TEST RESULTS SITE PHOTOGRAPHS

SHEET NO.

6-7

REFERENCE

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY POLK

PROJECT DESCRIPTION REALIGNMENT OF 1-26 AND US 74 INTERCHANGE NORTH OF NC 108

SITE DESCRIPTION BRIDGE OVER RAMP (-E CONN REV-) ON RAMP (-RP E-) BETWEEN I-26 AND US 74

STATE	STATE PROJECT REFERENCE NO.	NO.	SHEETS
N.C.	I-4729A	1	9

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOL. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE OR INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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INVESTIGATED BY TERRACON CONSULTANTS

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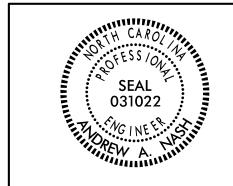
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AUGUST 2017

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andrew Mash

8/10/2017

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PROJECT REFERENCE NO.

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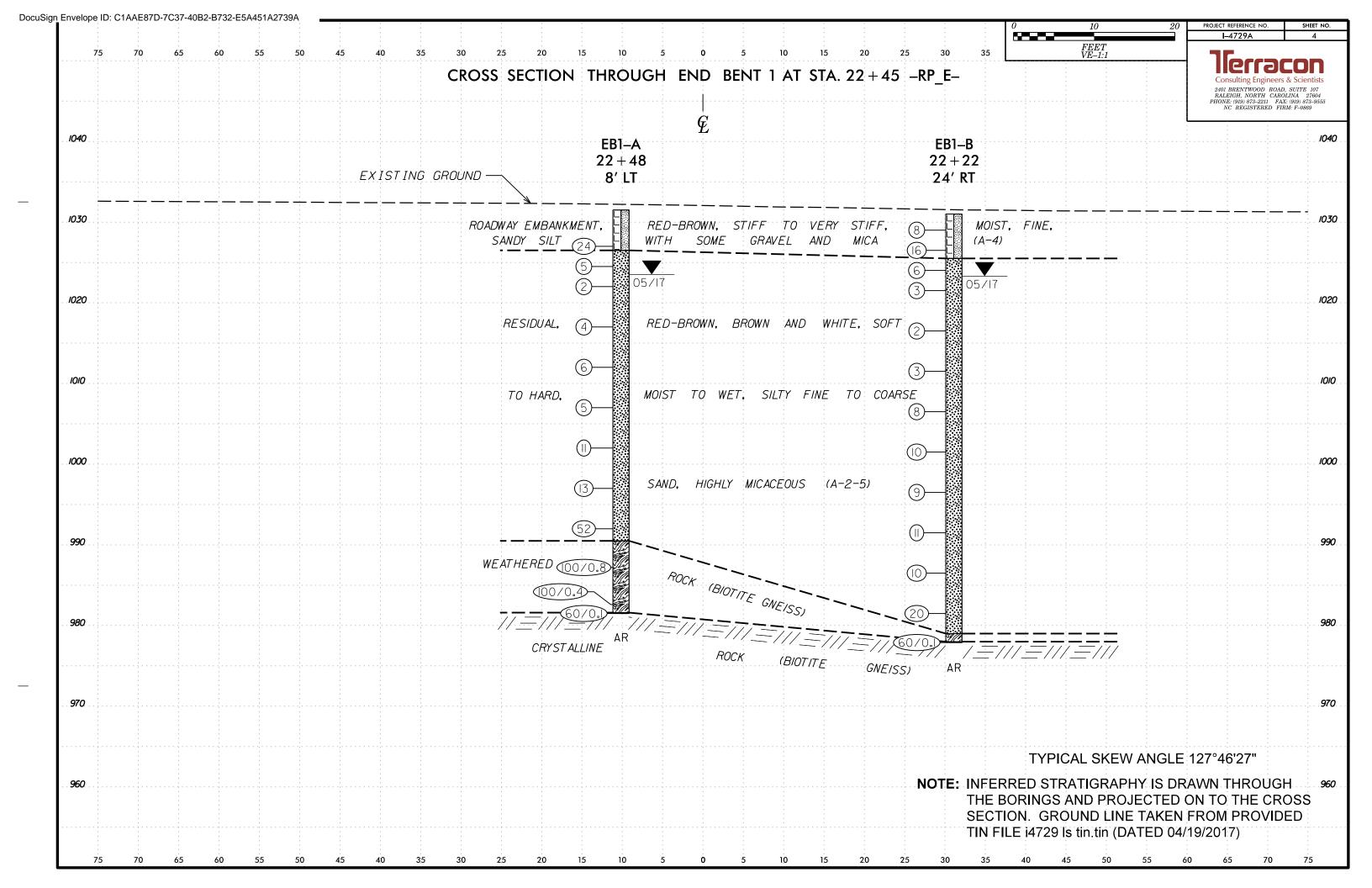
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SULTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED VILLE NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CENERAL CRANIII AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE,	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	UNEISS, OHBERU, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-0 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 0000 d0000 d00000 d0000 d00000 d0000 d00000 d0000 d00000 d0000 d00000 d0000 d00000 d0000 d000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR CLAY MUCK, *40 30 MX 50 MX 51 MN GRANULAR SOILS SOILS PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 50ILS WITH	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 11 MN 11 MN HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOULS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN BATING FAIR TO	<u> </u>	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	- UU- SPRING ON SEEP	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK, IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
CONSISTENCY (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION F ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL SPOT DATE TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR LUUSE 4 10 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	VST PMT INSTRICTION	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
(NON-COHESTVE) DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERT DENSE 2 200	INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT < 2 < 0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.5	Y	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 TO 15 1 TO 2	→ → → → → → ALLUVIAL SOIL BOUNDARY \(\triangle \) PIEZOMETER INSTALLATION \(\triangle \) SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4	INSTRUCTION	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK,
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	USED IN THE TOP 2 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM YST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN Ø.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT,) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
LL LIOUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	
(PI) PL PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: CONB-44; N: 561,465.5, E: 1,042,862.8 STA:: 10+89.35
- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: 1033.73 FEET
OM OPTIMUM MOISTURE SULTS HI ON NEAR OFTIMUM MOISTURE SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE	NOTEC
SE	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY	CME-55 CORE SIZE:	INDURATION	
	-	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	CME-550	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST CASING WY ADVANCER HAND TOOLS:	GENILE BLUW BY HAMMER DISINIEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	BORTARIE HOICT TRICONE STEEL TEETH POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TOYOUT TOYOUT AUGUST	CDAING ADE DIEETCH T TO SEPARATE WITH STEEL DROPE.	
	TRICONE TUNGCARB. SOUNDING ROD	INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
HOUR LENG SOUTH AS ELOTH, DHINK, STITEMED, ETC. MIC USED TO DESCRIBE METCHMANCE.	X 3¼" HOLLOW STEM AUGER	EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-





								BOF	KE L	UG					. —																				
WB	S 701750	72		Т	IP I-4729	A	COL	INTY PO	OLK			GEOL	OGIST WERITZ, M.	Α.	WE	3S 7017	5072			TI	P I-472	9A		COUN	TY POLK				GE	OLOGIS	ST WER	ITZ, M. A.			
SITE	E DESCRII	PTION	BRIDGE (OVER F	RAMP (-E_	CONN_R	EV-) ON	RAMP ((-RP_E-)) BETWI	EEN I-26 /	AND U.S.	74	GROUND WTR (ft)	SIT	TE DESCF	RIPTION	I BRID	OGE O	VER R	AMP (-E	_CON	IN_RE	V-) ON F	RAMP (-RP_	_E-) B	BETWE	EN I-2	6 AND U.S	. 74			GROU	ND WTR	(ft
BOF	RING NO.	EB1-A	RPE	s	TATION :	22+48		OFF	FSET 8	3 ft LT		ALIG	NMENT -RPE-	0 HR. 8.2	ВС	RING NO	. EB1-	B RPE		ST	ATION	22+2	22		OFFSET	Г 24	ft RT		ALI	GNME	NT -RPE	-	0 HR.		8.0
COL	LAR ELE	V. 1,03	31.5 ft	Т	OTAL DEF	PTH 50.0	O ft	NOF	RTHING	561,3	97	EAST	ING 1,042,632	24 HR. 8.0	СО	LLAR EL	EV. 1	031.0 f	ft	TC	TAL DE	EPTH	53.1 f	t	NORTH	ING :	561,359	9	EAS	STING	1,042,64	ŀ8	24 HR.		7.
DRIL	L RIG/HAM	ΛER EFF.	/DATE TE	R346 D	EDRICH D-5	0 90% 03	/10/2017			DRILL N	METHOD H	I.S. Augers	HA	MMER TYPE Automatic	DRI	ILL RIG/HAI	/MER EI	F./DATI	E TER	R346 DII	EDRICH D	-50 90	% 03/10)/2017	_	D	ORILL ME	THOD	H.S. Auger	s		HAM	MER TYPE	Automati	ic
DRII	L LER EK	LUND, N	M. A.	S	TART DAT	ΓE 05/18	3/17	COI	MP. DA	TE 05/	18/17	SURF	ACE WATER DEPTH	N/A	DR	RILLER E	KLUNE), M. A.		ST	ART DA	ATE (05/17/1	7	COMP.	DATE	E 05/17	7/17	SUF	RFACE	WATER	DEPTH N	I/A		
ELEV	DRIVE ELEV		BLOW CO			BLOW	S PER F	ООТ		SAMP.	L	T .	SOIL AND ROCK D	ESCRIPTION	ELE				w co			В	LOWS	PER FO	TC TC		SAMP.		L .		SOIL AND	ROCK DE	SCRIPTION	J	
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NTERCHANGE	‡											F	Boring Terminated W PENETRATION TES	ITH STANDARD ST REFUSAL at		978.0	53.0	60/0.1			<u> </u>			1	60/0	0.1	-		979 <u>.0</u> 978.0 977.9			ATHERED I			- <u>53</u>
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Consularing Engineers of Selections		BORE LOG						
WBS 70175072		UNTY POLK	GEOLOGIST WERITZ, M. A.		WBS 70175072		TY POLK	GEOLOGIST WERITZ, M. A.
	GE OVER RAMP (-E_CONN_REV-) O			ID WTR (ft)	SITE DESCRIPTION BRIDGE OVE	, ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '		· ·
BORING NO. EB2-A RPE	STATION 23+28	OFFSET 8 ft LT	ALIGNMENT -RPE- 0 HR.	8.4	BORING NO. EB2-B RPE	STATION 23+07	OFFSET 24 ft RT	ALIGNMENT -RPE- 0 HR. 8.
COLLAR ELEV. 1,033.4 ft		NORTHING 561,465	EASTING 1,042,675 24 HR.	8.3	COLLAR ELEV. 1,033.3 ft	TOTAL DEPTH 58.5 ft	NORTHING 561,430	EASTING 1,042,690 24 HR. 8.
DRILL RIG/HAMMER EFF./DATE DRILLER EKLUND, M. A.	TER346 DIEDRICH D-50 90% 03/10/2017 START DATE 05/16/17	DRILL METHOD H	S. Augers HAMMER TYPE SURFACE WATER DEPTH N/A	Automatic	DRILL RIG/HAMMER EFF./DATE TER340 DRILLER EKLUND, M. A.	START DATE 05/16/17	DRILL METHOD H	S. Augers HAMMER TYPE Automatic SURFACE WATER DEPTH N/A
ELEV DRIVE DEPTH BLOW			SURFACE WATER DEPTH IN/A		ELEV DRIVE DEBTH BLOW COUN			
(ft) ELEV (ft) 0.5ft (0.5ft 0.5ft 0 25 50	75 100 NO. MOI G		DEPTH (ft)	(ft) ELEV (ft) 0.5ft 0.5ft 0		75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION
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1.032.4 1.0	<u> </u>		- 1,033.4 GROUND SURFACE RESIDUAL	0.0	1,032.3 1.0	<u> </u>	- LPG	1,033.3 GROUND SURFACE (ROADWAY EMBANKMENT
	3 4 <u>A</u> -	M	WHITE AND RED TO BROWN, SILT FINE TO COARSE SAND, HIGHLY			5 14	M L	1,030.8 DARK GRAY, SILTY FINE TO COARSE SAND WITH SOME GRAVEL
2	2 3	M	MICACEOUS		4 3	2 •5	· · · · · · M	RESIDUAL WHITE, BROWN AND GRAY, SILTY FINE
	2 3		- - -		1,027.3 6.0 2 2	2 4	· ···	TO COÁRSE SAND, HIGHLY MICACEOUS
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			F 997.4 BROWN AND WHITE, SILTY FINE SA	AND		• • • • • • • • •		<u></u>
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+ 14	45 41	. • • • • • • • • • • • • • • •	982.4	51.0	16 19 2	28	· · · · ·	
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980 979.9 53.5	23/0.1	- 100/0.6	(BIOTTE GNEISS)		980 979.8 53.5 23 30 4	40		 - -
								977.3 <u>WEATHERED ROCK</u> 5
975 974.9 58.5	32 68/0 4		-		975 974.9 58.4 60/0.1		60/0.1 W	十 (BIOTITE GNEISS) _
1 T I I		100/0.6 W						(BIOTITE GNEISS) Boring Terminated WITH STANDARD
970 969.9 63.5			969.6	63.8				PENETRATION TEST REFUSAL at Elevation 974.8 ft IN CRYSTALLINE ROCK
100/0.3		100/0.3	Boring Terminated at Elevation 969.6 f WEATHERED ROCK (BIOTITE GNEI	ft IN				(BIOTITE GNEISS)
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LABORATORY TESTING SUMMARY

PROJECT NUMBER:	70175072	TIP:	I-4729A	COUNTY:	POLK

DESCRIPTION: REALIGNMENT OF I-26 AND US 74 INTERCHANGE NORTH OF N.C. 108- BRIDGE OVER RAMP (-E_CONN_REV-) ON RAMP (-RP_E-) BETWEEN I-	·26 AND U.S.74
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				Depth					% by W	/eight		% Passing (sieves)			Ave. Wet		Shear Stren	gth Values				
Sample No.	Alignment	Station	Offset (feet)	Interval (feet)	AASHTO Class.	L.L.	P.I.	Coarse Sand	Fine Sand	Silt	Clay	Retained #4 Sieve	#10	#40	#200	% Moisture	% Organic	Unit Wt. (pcf)	Total Cohesion	Shear Stren Total Friction (φ)	Effective Cohesion	Effective Friction
SS-14	-RP_E-	22+48	8' LT.	8.5-10.0	A-2-5 (0)	56	NP	53.6	31.5	8.4	6.5	0	100	68	19	57.2	N/D	N/D	(psf) N/D	N/D	(psf) N/D	(φ') N/D
SS-16	-RP_E-	23+07	24' RT.	23.5-25.0	A-2-5 (0)	51	NP	50.3	29.3	13.2	7.2	0	98	65	25	44.9	N/D	N/D	N/D	N/D	N/D	N/D
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Stephanie H. Huffman Certified Lab Technician Signature 114-01-1203 Certification Number

SITE PHOTOGRAPHS REALIGNMENT OF I-26 AND US 74 INTERCHANGE NORTH OF NC 108 - BRIDGE OVER RAMP (-E_CONN_REV-) ON RAMP (-RP_E-) BETWEEN I-26 AND US 74



PHOTOGRAPH NO. 1: SOUTH APPROACH TO END BENT NO. 1 ON -RP_E- ALIGNMENT, LOOKING NORTH



PHOTOGRAPH NO. 2: ON -E_CONN_REV-ALIGNMENT LEFT SHOULDER, SOUTH OF -RP_E- ALIGNMENT, LOOKING NORTH



PHOTOGRAPH NO. 3: ON -E_CONN_REV-ALIGNMENT RIGHT SHOULDER, NORTH OF -RP_E- ALIGNMENT, LOOKING SOUTH



PHOTOGRAPH NO. 4: NORTH APPROACH TO END BENT NO.2 ON -RP_E- ALIGNMENT, LOOKING SOUTH

REFERENCE

CONTENTS SHEET NO.

7-11

12-13

DESCRIPTION TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN **CROSS SECTIONS** BORE LOGS, CORE LOG AND CORE PHOTOGRAPHS SOIL TEST RESULTS AND CORE SAMPLE RESULTS SITE PHOTOGRAPHS

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY POLK

PROJECT DESCRIPTION REALIGNMENT OF 1-26 AND US 74 INTERCHANGE NORTH OF NC 108

SITE DESCRIPTION BRIDGE OVER I-26 (-EL-) ON RAMP (-RP F-) BETWEEN US 74 AND I-26 STATE PROJECT REFERENCE NO. 14 I–4729A

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (1991) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOL. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE OR INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

RIGGS, A. F.

WERITZ, M. A.

EKLUND, M. A.

STUDNICKY, R. T.

McMILLIAN, M. F.

INVESTIGATED BY TERRACON CONSULTANTS

DRAWN BY

FIELDS, W.D.

CHECKED BY

RIGGS, A. F.

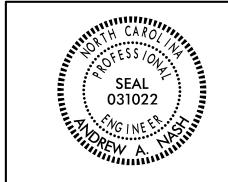
SUBMITTED BY

TERRACON CONSULTANTS

AUGUST 2017



2401 BRENTWOOD ROAD, SUITE 107 RALEIGH, NORTH CAROLINA 27604



andrew Mash

8/10/2017

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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.

1–4729A

2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤35% PASSING *200) (>35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	UNEISS, OHBERU, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-0 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-3-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CATSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL COCOGCOCOG	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
■10 50 MX GRANULAR SIL1-	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
#40 30 MX 50 MX 51 MN SOLS SOILS SOILS SOILS SOILS SOILS SOILS	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 SOUS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL — — 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR LITTLE OR LITTLE OR	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CROUP INDEX A A A A WY A MY 12 MY 16 MY NO MY AMOUNTS OF ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS ORGANIC	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND FINE SILIT OR CLAYET SILIT CLAYET MATTER	▼ STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU	<u> </u>	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	· · · · · · · · · · · · · · · · · · ·	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELO.
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED	I∏ 25,425	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) PROADWAY EMBANKMENT (RE) PROADWAY EMBANKMENT (RE) PROCK STRUCTURES OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
VERY LOOSE 44	SPT C SLOPE INDICATOR	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GENERALLY LOOSE 4 TO 10	SOIL SYMBOL OPT ONT TEST BORING INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
MATERIAL MEDIUM DENSE 10 10 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THIN KOMDWH I EMBHIAKMENT	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	── INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM,
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	A DIEZOMETED	SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIF	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	USED IN THE TOP 2 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - SEED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GOIDE FOR FIELD MOISTORE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT,) FROM BELOW THE GROUND WATER TABLE LL LIQUID LIMIT	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC CEMICOL ID DEGUIDES DOVING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RAINGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: BL-6; N: 561,102.9, E: 1,104,206.8
" PLL + PLASTIC LIMIT -	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	STA. 66+44.64
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 1063.27 FEET
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CI CONTINUOUS ELICUT AUSED	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
ATTAIN UPTIMUM MUISTURE	CME-55	THINLY LAMINATED < 0.008 FEET	
PLASTICITY		INDURATION	
PLASTICITY INDEX (PI) ORY STRENGTH		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	X CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST X TRICONE 25% STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	X D-50 (TER346) X DRAG BIT SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CORE BIT VANE SHEAR TEST		
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X 31/4" HOLLOW STEM AUGER	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
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PROJECT REFERENCE NO.

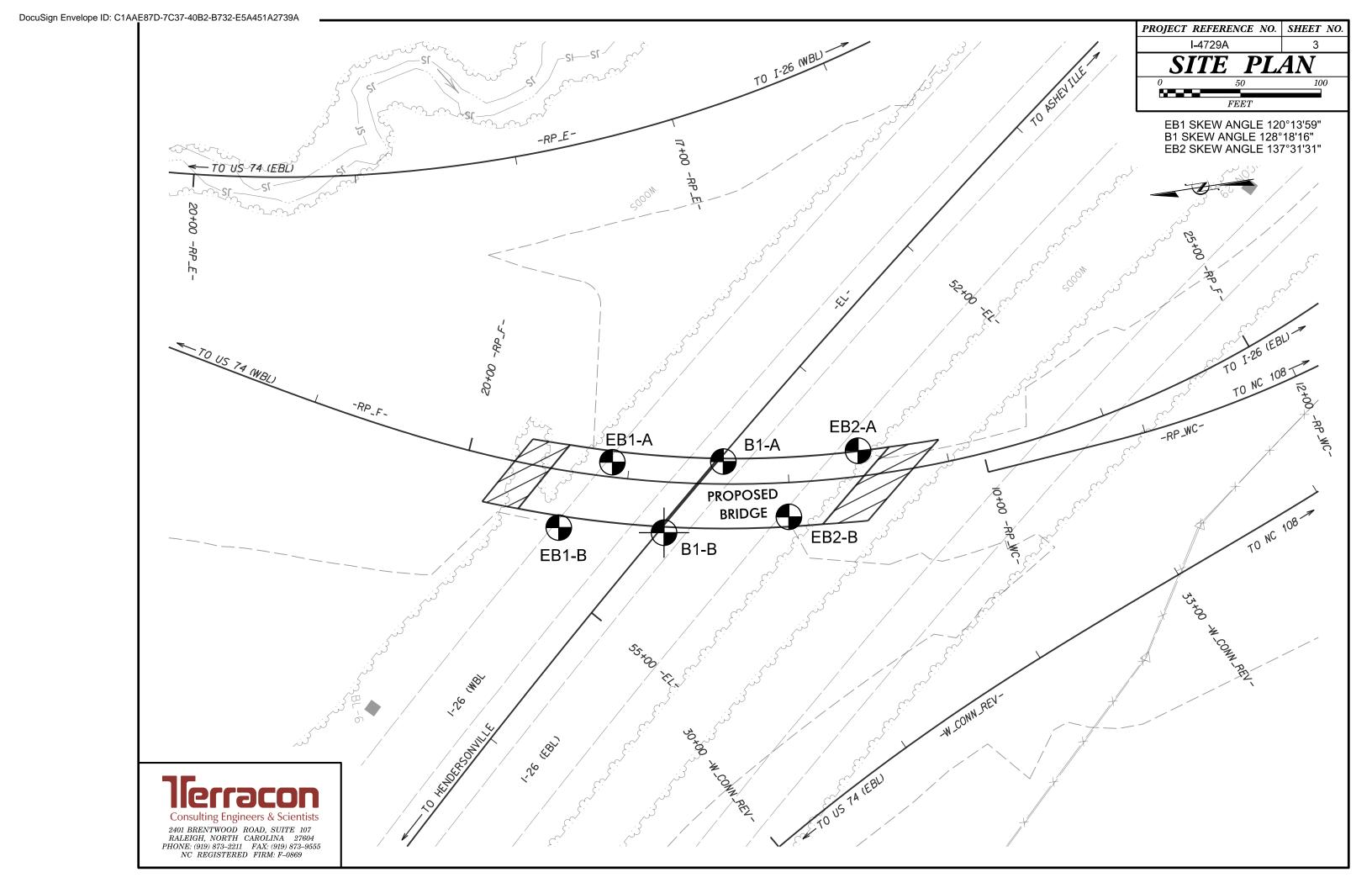
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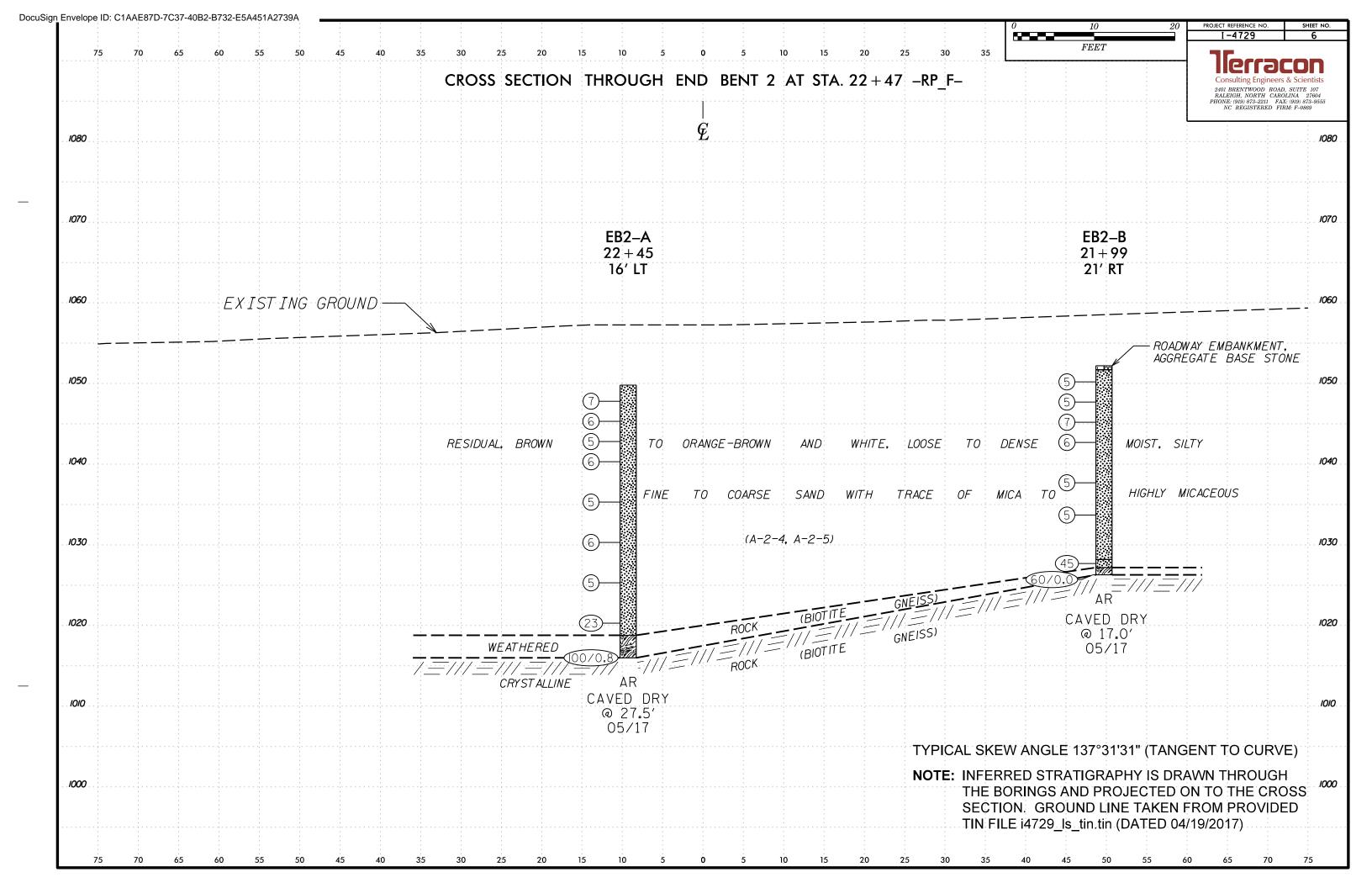
I-4729A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

	30230111				
	SUPPLEMENTAL LEGENI FROM AASHTO	D, GEOLOGIC LRFD BRID	SAL STRENGTH INDEX (GSI) TABLES GGE DESIGN SPECIFICATIONS		
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointe	ed Rock Mass (Marinos and Hoek, 2000)		AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Det	formed Heterogeneous Rock	Masses (Marinos and Hoek, 2000)
fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.	SURFACE CONDITIONS VERY GOOD Very rough, fresh unweath surfaces Surfaces FAIR Smooth, moderately weath altered surfaces POOR Slickensided, highly weath	with compact coatings or fillings or angular fragments VERY POOR Slickensided, highly weathered surface with soft clay coatings or fillings	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000) From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.	- Lgu 2 L	FAIR - Smooth, moderately weathered and altered surfaces POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments VERY POOR - Very smooth, slicken-
STRUCTURE	DECREASING SURFACE QUALITY		COMPOSITION AND STRUCTURE		
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities BLOCKY - well interlocked un-	90 N//	/A N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass, in shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70 A	
VERY BLOCKY - interlocked, partially disturbed mass with	OCKING OF ROCK		B. Sand- stone with stone with stone and stiltstone layers of siltstone siltstone amounts Solltstone or silty shale with sand- stone layers shale with sandstone layers		C D E
BLOCKY/DISTURBED/SEAMY - folded with angular blocks	INTER 40		C. D. E. and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.		30 F 20
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces	DECREASING 30	20	G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed		/ H ₁ 10
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	V N/A N/A	10	Into small rock pieces. → Means deformation after tectonic disturbance		DATE







COLLAR ELEV. 1,057.0 FT TOTAL DEPTH 37.3 FT NORTHING 560.933 EASTING 1,042,335 24 HR. FT FT FT FT FT FT FT F												3OF		<u>L</u> (ÜĞ			1				
SORING NO. EB1-A RPF																		GEOLOG	IST WERITZ	, M. A.		
COLLAR ELEV. 1,057.0 ft TOTAL DEPTH 37.3 ft NORTHING 560,933 EASTING 1,042,335 24 HR. FIA	SITE	DESCR	IPTION	BRID	OGE O	VER	l-26 (-EI	L-) OI	N RAM	P (-R	RP_F-)	BETW	/EEN	U.S	5. 74 AN	ID I-2	6				GROUI	ND WTR (ft
DRILLER RICLUND, M. A. START DATE 60/06/17 COMP. DATE 06/06/17 SURFACE WATER DEPTH N/A	BORI	NG NO.	EB1-	A RPF		S	TATIO	N 20	+89			OF	FSET	9	ft LT			ALIGNME	NT -RPF-		0 HR.	Cave
START DATE	COLI	AR ELI	EV. 1,	057.0 1	ft	T	OTAL I	DEPT	H 37.	3 ft		NO	RTHI	NG	560,93	33		EASTING	1,042,335		24 HR.	FIAD
LEV CHEV C	DRILL	RIG/HAN	IMER EF	F./DAT	E TER	R346 D	IEDRICH	D-50	90% 03	3/10/20	017				DRILL M	ETHO	D H.S	S. Augers		HAMM	ER TYPE	Automatic
(II)	DRIL		KLUND				TART I	DATE	06/0	6/17		СО	MP. D	PΑΤ			4	SURFACE	WATER DEF	PTH N/	A	
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020		-	-				:::::::::::::::::::::::::::::::::::::			+				-			977	1,022.0	WEATH	FRED RO	OCK	35.
PENETRATION TEST REFUSAL at - PENETRATION TEST REFUSAL at - Elevation 1,019.7 ft ON CRYSTALLINE - ROCK (BIOTITE GNEISS) - 0 HR. WATER LEVEL CAVED DRY AT	1020	1,019. 7	37.3	60/0.0			<u> </u>	<u> </u>			<u> </u>	<u> </u>							(BIOTIT	E GNEI	SS)	37.
+ ROCK (BIOTITE GNEISS) - 0 HR. WATER LEVEL CAVED DRY AT		-	<u> </u>	60/0.0									00/0.	0				-	PENETRATION	ITEST R	REFUSAL	at
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GEOTECHNICAL BORING REPORT

SHEET 7 OF 14

									E	BOR	EL	.OG			
WBS	34243	.1.2			Т	ΙP	I-4729A		COUNT	Y PO	LK				GEOLOGIST WERITZ, M. A.
SITE	DESCR	IPTION	BRID	GE O	VER I	-26	6 (-EL-) O	N RAM	1P (-RP_F-) I	BETWE	EN U	.S. 74 <i>P</i>	ND I-2	26	GROUND WTR (ft
BOR	ING NO.	EB1-	B RPF		S	TA	ATION 20	+63		OFF	SET	35 ft R	-		ALIGNMENT -RPF- 0 HR. Caved
COL	LAR ELE	E V. 1,	058.5 f	t	Т	01	TAL DEPT	H 32	.0 ft	NOR	THING	560,	972		EASTING 1,042,300 24 HR. FIAD
DRILI	_ RIG/HAM	MER EF	F./DATE	TER	R346 D	IEC	DRICH D-50	90% 0	3/10/2017			DRILL	METHO	D F	H.S. Augers HAMMER TYPE Automatic
DRIL	LER E	KLUND	, M. A.		S	TA	ART DATE				IP. DA	TE 06		4	SURFACE WATER DEPTH N/A
ELEV (ft)	DRIVE ELEV	DEPTH (ft)	·——	W CO		$\ $			WS PER FOO		400	SAMF	17	\ \	SOIL AND ROCK DESCRIPTION
(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	H	0 2	5	50	75	100	NO.	/MC) G	G ELEV. (ft) DEPTH (f
1060	_	-													DAVEMENT CUREACE
	1,057.5	1.0	40			Ħ				-				L	- 1,058.5 PAVEMENT SURFACE 0 PAVEMENT 1,057.0 (51 AONILLA TO BENEFICE OF THE PARTY OF THE PAR
1055	1,055.0	35	13	8	4		12.						M		(5" ASPHALT, 13" BASE COURSE STONE)
	-	-	5	6	8	11	14						М		RESIDUAL RED-BROWN AND MAROON-BROWN,
	1,052.5	6.0	5	6	7	$\ $	13.			.			М		SILTY CLAY
1050	1,050.0	8.5	5	7	9	╢							١.,		\$
	-	-	3	,			16			: : :			M		3
1045	-						: : :								*
1045	1,045.0	13.5_ -	5	6	8	╁	• • •14					SS-3	28%		*
	-	-					::វ៉្::			-					16. ORANGE-BROWN TO RED-BROWN.
1040	1,040.0	- - 18.5				┨	• / • •								SILTY FINE TO COARSE SAND, HIGHLY MICACEOUS
	-	_	4	3	5		8			-			М		WICACLOUS
	-	-						* • •		.					- 1,036.5 GRAY, SILTY FINE TO COARSE SAND 22.
1035	1,035.0	23.5	5	36	24	╢			60	-			М		WITH TRACE OF MICA
	-	_								.					
1030	1,030.0	28.5													
	-	-	10	10	23	11		• 133			·		М	وغيرفها	- 1,028.5 30.
	1,026.5	- - 32.0				Ш					00/0.0				WEATHERED ROCK 1,026.5 (BIOTITE GNEISS) 32.
	-	_	60/0.0								60/0.0				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at
	-	- -													Elevation 1,026.5 ft ON CRYSTALLINE ROCK (BIOTITE GNEISS)
	-	-													
	-	-													0 HR. WATER LEVEL CAVED DRY AT 27.3'
	-	-													- -
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Terracon GEOTECHNICAL BORING REPORT

SHEET 8 OF 14

WBS	34243.	.1.2			1	Γ ΙΡ Ι-4729	9A	1	ORE L Y POLK				GEOLOGIST WERITZ, M. A.	
			BRII	DGE O					BETWEEN U	.S. 74 A	ND I-26	 6	1,,	GROUND WTR
	NG NO.					STATION			OFFSET		<u></u>	-	ALIGNMENT -RPF-	0 HR.
	AR ELE			ft	-+		PTH 41.8 f	t	NORTHING		65		EASTING 1,042,325	24 HR. FI
							50 90% 03/10		HORTIMA	DRILL N) Was	<u> </u>	MER TYPE Automati
	ER EK						TE 06/02/1		COMP. DA) wa.	SURFACE WATER DEPTH N	
	DDIVE		<u> </u>	DW CO		TIANI DA		PER FOOT		SAMP.	_	1	SURFACE WATER DEPTH IN	//A
(ft)	ELEV (ft)	DEPTH (ft)	0.5ft		_			50	7 <u>.</u> 5 100	NO.	MOI	0	SOIL AND ROCK DES	
	(11)		-						L	1.0.	7 IVIOI		ELEV. (ft)	DEPT
055														
055		-										-	- 1,053.2 GROUND SURI	FACE
-	1,052.2	1.0	4	4	4	# ::::					١		ROADWAY EMBAI	NKMENT
050	1,049.7	- - 35	4	"	4	. • 8 -					M		RED-BROWN, FINE SANI LENSES OF FINE SA	
	1	-	3	5	4	9 .	-				М			
ŀ	1,047.2	6.0	2	2	2	1 4 : :					M			
045	1,044.7	8.5	2	1	2	1 7		 			۱		-	
	1	-		'	2	∳ 3					M		1,042.2	
040	‡	-				- -							RESIDUAL BROWN, FINE SIL	
740	1,039.7	<u>- 13.5</u> -	3	4	5			1			М		. BROWN, I INC SIL	I I CLAI
	1	-				· T ° ·					'''			
)35	1.034.7	- - 18.5				<u> </u>							1,036.2 BROWN, FINE SAN	NDY SILT
	1,034.7	- 10.5	5	3	3	6.					М	₩F		
	1	-										F		
30	1,029.7	- - 23.5] 1 · ·								
	†	- -	3	3	3	∳ 6					М			
	1	-					-					Mt.		
)25	1,024.7	- 28.5	2	2	3			 • • • •	 		۱	 -	-	
	Ŧ	-		-		• 5	.				M	III.		
020	‡	-									1			
<u> </u>	1,019.7	- 33.5 -	2	1	3	4					М	F	-	
	‡	- -									1		0LIVE-GREEN AND WHI	TE SII TV EINE
)15	1,014.7	- - 38.5	L	L		<u> </u>	<u>,</u>				1	li::it	TO COARSE S	
Ī	1	-	3	9	27] :::	• 36_	ļ	· · · ·		М		1,013.2	2016
	1,011.4	41.8	60/0			1	1		60/0.0		М		1,011.4 WEATHERED R	
	7	-	60/0.0	"					60/0.0			1 F	Boring Terminated at Eleva	tion 1,011.4 ft IN
	‡	-											WEÄTHERED ROCK ((BK	JITE GNEISS)
	‡	-												
	‡	<u>-</u> -										-	•	
	1	-										<u> </u>		
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														EL	.00	7							
	34243						I-472			_	COUN								GEOLO	OGIST WERITZ	Z, M. A.		
	DESCR			DGE O	-					P (-F	RP_F-)						D I-2	6					D WTR (
	NG NO				_		ATION					-		ET					+	MENT -RPF-		0 HR.	N
	AR ELI				l l	_	TAL DE			_		N	IOR1	HINC						IG 1,042,287	1	24 HR.	17
	RIG/HAN				\neg						017	1.						D Wa	ash Boring			ER TYPE	Automatic
	LER E DRIVE		i	DW COL		STA	ART DA				ER FO		OMI	P. DA	_	ле. ЛР.		1 🗆	SURFA	CE WATER DE	PTH N/	A	
ELEV (ft)	ELEV (ft)	DEPTH (ft)		0.5ft	0.5	ft	0	25		50		75 	5	100	N		/	O I G	ELEV. (ft)	SOIL AND RO	OCK DES	CRIPTION	DEPTI
1060	- - -	 - - -																	 - -				
1055	1.054.3	10				\dashv	<u> </u>												1,055.3	GROUN DARK RED-BI	ND SURF		,
		‡	3	4	4		. 8 .			-		-	: :		SS	-30	27%		- -	D/WWW.			
1050	1,051.8-	3.5	4	3	3		6 .			:			: :				М		-				
030	1,049.3	6.0	5	5	8	-li	1			-		-					М		- -				
	1,046.8	8.5			5	4	9 1 /.	3.		-		-	: :						- -				
045	-	‡	4	4	5		. •69 .			-		-		• •			М		- 				
		‡					: ; :	-		-		-							- -				
040	-1,041.8 -	+ 13.5 +	3	4	6	1	· • ·			:		:					М		- -				
1040	-	‡				H	/.	-		-		-							-				
	1,036.8-	18.5			40		$j :: \mid$			-		-	: :						-				
035	-	‡	3	6	12			18		-		-		• •			М		1,035.8	BROWN, WHIT			
	-	‡						1		-		-	: :						- -	FINE TO	COARSE	SAND	
020	_1,031.8- -	23.5	4	8	14	-		1		:			: :				М		- -				
1030	-	‡						:		-									-				
	1,026.8-	28.5						:4		-:-	.	- : -		· ·				977	1,027.3	WFATH	HERED R	OCK	
025		‡	28	72/0.3				-	• • •	-		-	10	00/0.8	•				-		ITE GNEI		
	1,024.0	31.3	60/0.0	1						-		-		50/0.0	•				1,024.0		ALLINE R		
1020		‡								-		-	: :		RS	5-1			-	(BOILI	ITE GNEI	55)	
1020	-	‡						-		-									-				
		‡								-		-	: :						- -				
1015	-	‡								•		-		• •					-				
		‡						:		-	: : :	:	: :	: :	RS	2			- 				
	-	‡				\top	L			1	<u> </u>		••		1	,-2		7	1,011.9 B	Soring Terminated	at Elevat	ion 1,011.9	ft IN
	-	‡																	- (CRYSTALLINE RO			•
		‡																	- -	1) Advanced 2- 2) Advanced NW	Casing	one to 31. to 31.3', To	tal
	_	‡																	- -	3) Creek Water 4) Advanced NQ2	33.0' Used for	Drilling Flu	id
	-	‡																	- 2 -	1) Advanced NQ2	Core Fro	m 31.3' to 4	13.4'
		‡																	- -				
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GEOTECHNICAL BORING REPORT

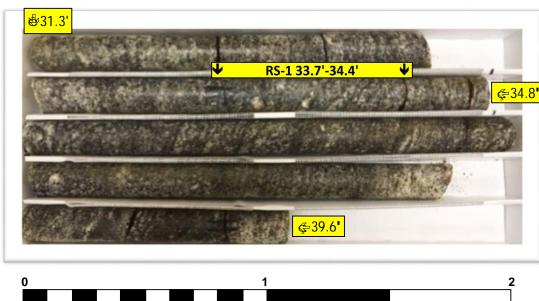
SHEET 9 OF 14

								RE L	OG				
WBS N/A		TIP	I-4729	9A	C	DUNT	Y P	POLK		GEOLOGIST WERITZ,	M. A.	1	
SITE DESCRIPTION BR	IDGE OVE	R I-26	(-EL-)	ON RAM	P (-RP	_F-) B			İ			1	ND WTR (ft)
BORING NO. B1-B RPF		STAT	TION	21+25			OF	FFSET 3	1 ft RT	ALIGNMENT -RPF-		0 HR.	N/A
COLLAR ELEV. 1,055.3	3 ft	TOTA	AL DE	PTH 43.	4 ft		NO	DRTHING	560,908	EASTING 1,042,287		24 HR.	17.3
DRILL RIG/HAMMER EFF./DA	TE TER346	DIEDR	RICH D-	50 90% 03	3/10/201	7			DRILL METHOD Wash	n Boring	HAMM	ER TYPE	Automatic
DRILLER EKLUND, M.	۹.	STAF	RT DA	TE 06/0	1/17		СО	OMP. DAT	E 06/02/17	SURFACE WATER DEP	TH N/	A	
CORE SIZE NQ2				N 12.1 ft		AT A							
ELEV RUN DEPTH RUN (ft) (ft)		REC. (ft) %	RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	ELEV. (ft		ESCRIPTION AND REMARK	S		DEPTH (ft)
1024.02	0:45/4.0	(0.5)	(0.4)		(40.4)	(44.7)	# 1 X	1 1 1 1 1 1		Begin Coring @ 31.3 ft			24.0
1,024.0 31.3 3.5 1,020.5 34.8 4.8 1,015.7 39.6 3.8	2:37/1.0 2:47/1.0 1:25/0.5 1:55/1.0 2:05/1.0 2:01/1.0 1:50/1.0 1:30/0.8	(4.8) 100%	(4.8) 100%	RS-1	(12.1) 100%	97%		1,024.0	WHITE, GRAY AND CLOSE TO MO	CRYSTALLINE ROCK LIGHT WEATHERING HARI HARD BLACK CRYSTALLINE ROC DDERATELY CLOSE FRACT WITH 10 JOINTS AT 15°-20 RMR= 58-64 GSI= 75-85	CK (BIOT	TITE GNE	
1,011.9 43.4	2:40/1.0	100%	100%	RS-2				1,011.9					43.4
1,011.0_40.4	1:54/0.8							-	Boring Terminated	at Elevation 1,011.9 ft IN CR ((BIOTITE GNEISS)	RYSTAL	LINE ROC	
									2) Adva 3) C	Advanced 2-15/16 Tricone to Inced NW Casing to 31.3', To Irreek Water Used for Drilling anced NQ2 Core From 31.3'	otal 33.0 Fluid		

34243.1.2 (I-4729A) BRIDGE OVER I-26 (-EL-) ON RAMP (-RP_F-) BETWEEN US-74 AND I-26

CORE PHOTOGRAPHS B1-B

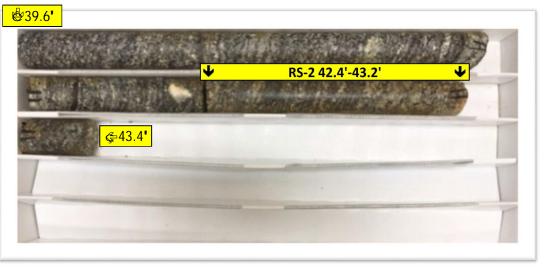
BOX 1: 31.3-39.6 FEET

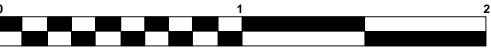




EET

BOX 2: 39.6-43.4 FEET





FEET



CONSC	ilding Erigi								В	<u>OR</u>	<u>E L</u>	<u>OG</u>							
WBS	34243	3.1.2			Т	IP I-4729	A	C	COUNT	Y PO	LK				GEOLOGI	ST WERITZ	Z, M. A.		
				OGE O		l-26 (-EL-)		P (-RI	P_F-) B	ETWE	EN U.	S. 74 Al	ND I-2	ô	T			GROUN	ID WTR (ft)
BOR	ING NO	. EB2-	A RPF		_	TATION				OFFS	SET	16 ft LT			ALIGNME			0 HR.	Dry
	LAR EL				- 1	OTAL DE				NOR	THING	560,7				1,042,319		24 HR.	Caved
					-	IEDRICH D-			17) H.S	S. Augers		_		Automatic
DRIL	LER E		i -			TART DA					P. DA	TE 05/3	31/17	1	SURFACE	WATER DE	PTH N/	Α	
(ft)	DRIVE ELEV (ft)	DEPTH (ft)	'	W COL	O.5ft	0	BLOW 25	50	R FOOT	75	100	SAMP. NO.	MOI	O G	ELEV. (ft)	SOIL AND RO	OCK DES	CRIPTION	DEPTH (ft
1050	_							-							_1,049.8		ND SURF	ACE	0.0
	1,048.8	ł	3	3	4	7	·						М		· В	ROWN, SILTY	ESIDUAL FINE SA CACEOUS	ND, HIGH	LY
1045	1,043.8	1	3	3	3	6	·		· · · ·	: :			М	-	-				
	· -	ŧ	3	2	3	 	. .						М	-					
040	_1,041.3 -	8.5	3	3	3	6	-	-					М	-	-				
	1.036.3	13.5						-		: :				ĮĮ	•				
035	1,036.3	13.5	3	2	3	5		-	· · · ·		• •		М		-				
	1.031.3	18.5						-	 					<u> </u>	· ·				
1030		10.5	3	3	3	- - - - - - - - - - - - - -		-			• •		М		-				
	1.026.3	23.5					.	-							• •				
1025		23.3	4	2	3	5		•			• •		М		· -				
1020	1,021.3	28.5	8	12	11			-					М						
	1,016.8- 1,016.0	33.0					. 1			+					. 1,018.8		HERED RO		31.0
	_1,016.0. _	33.8	22 60/0.0	78/0.3		11		- 1		1	00/0.8 60/0.0	1		-	B	oring Termina PENETRATIO	ted WITH	STANDAI	33.8 RD at
	-	Ī												[evation 1,016. ROCK (BI	0 ft ON C	RYSTALLI	
	-	<u> </u>													_ 24	HR. WATER I	_EVEL CA 27.5'	VED DRY	' AT
	-	 												-			27.10		
	_														· - ·				
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GEOTECHNICAL BORING REPORT

SHEET 11 OF 14

										В	OF	RE L	OG					
WBS	34243	.1.2			TI	IP I-4	4729A	<u> </u>		COUNT	Y PO	DLK				GEOLOGIST WERITZ, M	. A.	
	DESCRI				VER I	-26 (-l	EL-) O	N RAM	P (-R	P_F-) B	ETW	EEN U.	S. 74 AI	ND I-2	6		GROUI	ND WTR (ft)
BOR	ING NO.	EB2-E	3 RPF		S	TATIO	ON 2	1+99			OFF	SET 2	21 ft RT			ALIGNMENT -RPF-	0 HR.	Dry
COL	LAR ELE	E V. 1,0	052.8 f	ft	T	OTAL	DEP	TH 25.	9 ft		NOF	RTHING	560,8	30		EASTING 1,042,300	24 HR.	Caved
DRILL	. RIG/HAM	IMER EF	F./DATE	E TER	346 DI	EDRIC	H D-50	90% 03	/10/20)17			DRILL N	1ETHOI	D H.:	S. Augers H	AMMER TYPE	Automatic
DRIL	LER E	KLUND	, M. A.		S	TART	DATI	E 05/3	1/17		COI	MP. DA	TE 05/	31/17		SURFACE WATER DEPTH	N/A	
ELEV	DRIVE ELEV	DEPTH		W CO						R F001			SAMP.	V /		SOIL AND ROCK	DESCRIPTION	١
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	-	25	50)	75	100	NO.	/MO	I G	ELEV. (ft)		DEPTH (ft)
1055	_	-														_		
						Ц,										1,052.8 GROUND S		0.0 0.5
1050	1,051.8-	- 1.0 -	3	2	3				- 1		- 1			М		ROADWAY EN AGGREGATE BASE		ONE
1030	1,049.3	3.5	3	2	3			<u> </u>			1:			١,,		RESID BROWN TO ORANG		LTY
	- 1,046.8-	- - 6.0				🔨			-		:			M		FINE SAND, HIGH		
1045	-		4	4	3		7		•		<u>.</u>			М		- -		
	1,044.3	8.5	4	3	3		 3		-		-			М				
	}	_				¦					-					<u>-</u> -		
1040	1,039.3	13.5						1	-		+							
	-	Ī	3	3	2	• 5		: : :	-		:	: : :		М		- -		
1035	1,035.3	17.5						: : :			:					-		
1000	-		3	2	3	• 5			-		-			М		- -		
								.] : : :			:					- -		
1030	1.029.3	- 00 5									:					<u>-</u>		
	1,029.3	23.5	7	11	34	:			4 5		:			М		<u>1,028.8</u> <u>1,027.8</u> WHITE, GRAY AND E	BLACK, SILTY	FINE 24.0 25.0
	1,026.9	25.9	60/0.0			μ.						60/0.0	\dashv		777	$\frac{1,026.9}{1}$ TO COARSE SAND W	ITH TRAE OF	
	-															- WEATHER! - (BIOTITE C		
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LABORATORY TESTING SUMMARY

PROJECT NUMBER:	34243.1.2	TIP:	I-4729A	COUNTY:	POLK

DESCRIPTION: 1-26 / US 74 Interchange - Bridge over I-26 (-EL-) on Ramp (-RP_F-) between US 74 and I-26

				Depth					% by V	Veight		%	%	Passing (sie	ves)			Ave. Wet		Shear Stren	ath Values	
Sample No.	Alignment	Station	Offset (feet)	Interval	AASHTO Class.	L.L.	P.I.	Coarse	Fine Sand	Silt	Clay	Retained #4 Sieve	#10	#40	#200	% Moisture	% Organic	Unit Wt.	Total Cohesion	Total Friction (φ)	Effective Cohesion	Effective Friction
00.00				(feet)	. = . (22)			Sand										(pcf)	(psf)		(psf)	(φ') N/D
SS-30	-RP_F-	21+25	31' RT	1.0 - 2.5'	A-7-6 (28)	63	40	18.1	13.5	7.9	60.5	0	100	89	70	27.0	N/D	N/D	N/D	N/D	N/D	N/D
SS-33	-RP_F-	20+63	35' RT	13.5 - 15.0	A-7-5 (27)	75 70	40	23.9	11.4	7.5	57.2	0	100	83	66	27.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-34	-RP_F-	20+89	9' LT	8.5 - 10.0	A-7-5 (23)	73	35	20.4	17.9	13.4	48.3	0	99	87	64	31.4	N/D	N/D	N/D	N/D	N/D	N/D
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N/D - NOT DETERMINED

Certified Lab Technician Signature

114-01-1203
Certification Number

UNCONFINED COMPRESSION (ASTM D7012 Method C)

Project: 34243.1.2 (1-4729A)

Description: BRIDGE OVER I-26 (-EL-) ON RAMP (-RP_F-) BETWEEN US-74 AND I-26

County: POLK COUNTY, NORTH CAROLINA

F. A. ID No.: N/A

TERRACON Project No.: 70175072



Boring No.	Sample Id	Depth	Dimens	ions, in.	Specific Gravity	Area	Unit Weight	Loading Rate	Maximum Load	Strength	Moisture	Dook Tyme (CCI*)
Doring No.	Sample 10	(ft)	Length	Diameter	Specific Gravity	(in^2)	(lbs/ft ³)	(lb/sec)	(lbs)	(psi)	(%)	Rock Type (GSI*)
B1-B	RS-1	33.7 - 34.4	4.12	1.99	2.77	3.11	172.0	139	22,035	7,100	0.10	Piotito Choiga (75 95)
B1-B	RS-2	42.4 - 43.2	4.70	1.98	2.82	3.09	174.0	150	28,315	9,170	0.07	Biotite Gneiss (75-85)

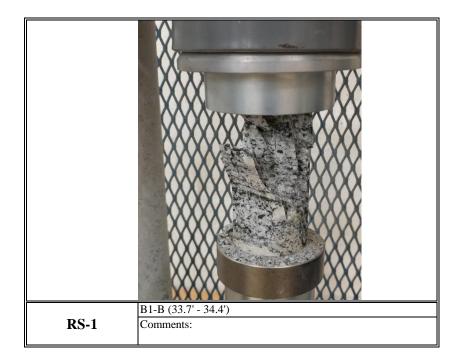
NOTES:

*GEOLOGIC STRENGTH INDEX

Effective (as received) unit weight

Loading rates were selected to target reaching failure between 2 and 15 minutes.

ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content and chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and other rock types and other rock types and other rock types and other rock types and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, prepare the rock specimen to the closest tolerances practicable and consider this to be the best effort and report it as such and if allowable or necessary for the intended test, capping the ends of the specimen as discussed in this





34243.1.2 (I-4729A) SITE PHOTOGRAPHS

REALIGNMENT OF I-26 AND US 74 INTERCHANGE NORTH OF NC 108 - BRIDGE OVER I-26 (-EL-) ON RAMP (-RP_F-) BETWEEN US-74 AND I-26



PHOTOGRAPH NO. 1: NORTH APPROACH TO END BENT NO. 1 ON -RP_F- ALIGNMENT, LOOKING SOUTH



PHOTOGRAPH NO. 2: ON I-26 (WBL) -EL- ALIGNMENT OUTSIDE SHOULDER, EAST OF -RP_F- ALIGNMENT, LOOKING WEST



PHOTOGRAPH NO. 3: ON I-26 (EBL) -EL-ALIGNMENT OUTSIDE SHOULDER, WEST OF -RP_F- ALIGNMENT, LOOKING EAST



PHOTOGRAPH NO. 4: SOUTH APPROACH TO END BENT NO.2 ON -RP_F- ALIGNMENT, LOOKING NORTH

REFERENCE

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5–6	BORE LOGS
7	LABORATORY SAMPLE RESULT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY POLK

PROJECT DESCRIPTION <u>REALIGNMENT OF I-26 AND</u> US 74 INTERCHANGE NORTH OF NC 108 IN COLUMBUS, NORTH CAROLINA SITE DESCRIPTION CULVERT AT STA. 20+89 -RP E-AND STA. 16+47 -RP F-

STATE PROJECT REFERENCE NO. I–4729A

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-680. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS OF THE INVESTIGATION. THE STATEM LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE INVESTIGATION. THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AS WELL AS A CRUPP NOW CHARTSE CACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- IES:
 THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
 OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
 OR CONTRACT FOR THE PROJECT.
 BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
 FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
 CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL RIGGS, Jr., A. F. WERITZ, M. A. EKLUND, M. A. McMILLIAN, M. F.

INVESTIGATED BY TERRACON CONSULTANTS FIELDS, W. D. DRAWN BY RIGGS, Jr., A. F. CHECKED BY SUBMITTED BY TERRACON CONSULTANTS AUGUST 2017

andrew Mash SIGNATURE

8/10/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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PROJECT REFERENCE NO.

1–4729A

2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	GAP-GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE CRYSTA	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
LLASS. (\$39% PASSING "200) (>30% PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-4-6 A-7 A-1, A-2 A-4, A-5 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d0000 d000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
7. PASSING	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR SIL1- MUCK,	PERCENTAGE OF MATERIAL	(CP) ————————————————————————————————————	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 38 MX 58 MX 51 MN 51 MN 51 MX 52 MX 16 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	<u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE UK HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AND MX ORGANIC SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. OF MAIOR CRAYEL AND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	<u> </u>	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.
AS SUBURADE PUUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS < LL - 38; PI OF A-7-6 SUBGROUP IS > LL - 38 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PANCE OF STANDARD PANCE OF LINCONFINED		(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE (TONS/FTZ)	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE (4	SPT CLODE MINICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
CRANIII AR LOOSE 4 TO 10	SOIL SYMBOL OPT ONT TEST BORING SLOPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50 (NON-COHESIVE) MEDIUM DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
שפר אפרול שפר איני שפי שפר איני שפי שפי שפי שפי שפי שפר איני שפי שפי שפי שפי שפי שפי שפי שפי שיי שפי שיי שפי שיי שפי שיי		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT < 2 < 0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.5	— INFERRED SOIL BOUNDARY — CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	A ALLUMIAL SOIL BOUNDARY A PIEZOMETER SPI N. VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4	INSTALLATION	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
COARSE FINE	SHALLOW UNCLASSIFIED EXCAVATION -	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(USE, SU.) (F SU.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF) OF
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE OFFICIAL STATES OFFICIAL ST	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GOIDE FOR FIELD MOISTORE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PL PLASTIC LIMIT	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING TERM SPACING TERM THICKNESS	BENCH MARK: CONB-44; N: 56I,465.5, E: I,042,862.8 STA.: I0+89.35
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	
SL _ SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55 G'CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY	8* HOLLOW AUGERS	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS: FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST VANE SHEAR TEST W/ ADVANCER HAND TOOLS:	CRAINS CAN BE CERARATED FROM CAMBLE WITH CITEL BRODE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	X TRICONE 25% 'TUNG-CARB. COUNTING DOD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X D-50 (TER346) CORE BIT SOUNDING ROD VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X DRAG BIT	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1

